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Analysis on Advantages and Disadvantages of Technology Used by Chinese Men's Basketball Team in the Basketball Match at the 29th Olympic Games

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Abstract. This article makes a statistics of 13 skill indexes of Chinese Men's basketball matches in 29th Olympic Games according to the evaluation standard of International Basketball Association' skill index. Grey relational analysis theory is used to make a quantitative analysis of the skill indexes according to the statistical data. The result shows the defense skill is superior to attack skill. This research achievement supplies theoretical reference for the scientific training of Chinese men's basketball team

Keywords: Olympic Games, Chinese men's basketball team, skills, advantages and disadvantages.

1. Foreword

At the 29th Olympic Games, Chinese Men's Basketball Team ranked the eighth place with the performance of 2 wins and 4 losses. Although having "Good Timing, Geographical Convenience and Good Human Relations", Chinese Men's Basketball Team only achieves the objective, but does not make a historic breakthrough. The reasons for it are worthy of deep thought of Chinese basketball field and also the research subject that Chinese basketball field must face. On referring to relevant outcomes of the study on literatures, we find that the probability statistics method is usually adopted to analyze Chinese Men's Basketball Team's technical statistic data at the Olympic Games. This study is on the basis of Chinese Men's Basketball Team's technical statistic data in the six matches at the 29th Olympic Games and in accordance with the requirements on technical statistic index for basketball match of International Basketball Federation, and applies grey relational analysis theory to completely and systematically analyze the advantages and disadvantages of the technology used by Chinese Men's Basketball Team at the 29th Olympic Games, which provides Chinese Men's Basketball Team with scientific theory reference basis for future scientific sport training and technological improvement in future world race.

2. Study Object and Method

2.1. Study Object

Based on six matches of Chinese Men's Basketball Team VS other countries and according to 13 technical statistic indexes of basketball match universal in International Basketball Federation, the index data is shown as Table 1 through theoretical analysis and numerical calculation.

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Table 1 Schedule for Technical Statistic Data of Six Matches of Chinese Men's Basketball Team VS Other Countries at the 29th Olympic Games

VS Countries	Win/Loss Point	2-point Attempts	2-point Shot Percentage	3-point Attempts	3-point Shot Percentage	Free Throws Attempted$_5$	Free Throw Percentage	Offensive Rebound	Defensive Rebound	Assist	Error	Steal	Foul
USA	70/101	41	0.32	27	0.37	15	0.93	13	24	12	18	2	20
Spain	75/85	36	0.47	28	0.36	15	0.73	12	20	13	20	13	22
Angola	85/68	26	0.81	22	0.32	25	0.88	8	29	17	15	6	12
Germany	59/55	41	0.37	20	0.25	21	0.67	10	32	8	9	6	14
Greece	77/91	29	0.66	30	0.3	15	0.8	9	20	11	12	5	17
Lithuania	68/94	34	0.47	21	0.19	27	0.89	11	20	9	15	3	15

2.2. Study Method

Literature method, grey relational analysis method, comparative analysis method and system analysis method

3. Results and Analysis

3.1. Technical Index Statistics of Chinese Men's Basketball Team in Match at the 29th Olympic Games

According to Technical Statistic Data of Chinese Men's Basketball Team at the 29th Olympic Games in Table 1, the results are shown as Table 2 through statistic treatment.

Table 2 Schedule for Technical Statistic Results of Six Matches of Chinese Men's Basketball Team at the 29th Olympic Games

VS Countries	Win/Loss Point	2-point Attempts	2-point Shot Percentage	3-point Attempts	3-point Shot Percentage	Free Throws Attempted$_5$	Free Throw Percentage	Offensive Rebound	Defensive Rebound	Assist	Error	Steal	Foul
USA	0.6930	41	0.32	27	0.37	15	0.93	13	24	12	18	2	20
Spain	0.8823	36	0.47	28	0.36	15	0.73	12	20	13	20	13	22
Angola	1.2500	26	0.81	22	0.32	25	0.88	8	29	17	15	6	12
Germany	1.0727	41	0.37	20	0.25	21	0.67	10	32	8	9	6	14
Greece	0.8461	29	0.66	30	0.3	15	0.8	9	20	11	12	5	17
Lithuania	0.7234	34	0.47	21	0.19	27	0.89	11	20	9	15	3	15
Mean Value	0.9113	34.50	0.49	24.67	0.30	19.67	0.82	10.50	24.17	11.67	14.83	5.83	16.67

3.2. Analysis on Advantages and Disadvantages of Grey Relation

The analysis on advantages and disadvantages of this study is on the basis of the method of analysis on advantages of grey relational analysis theory, and its principle is that reference sequence is mother sequence (or mother factor), comparison sequence is son sequence (or son factor), and mother sequence and son sequence compose relational matrix. Analyze the relations among all factors and find out advantage factor and disadvantage factor by relational matrix. According to degrees of relation of each row and each column of relational matrix r, judge the relationship between son sequence and mother sequence, and analyze that which factors are primary influencing factors and which factors are secondary influencing factors. Primary influencing factors are called as advantage factors, and minimum influencing factors are called as disadvantage factors.

3.2.1 Confirm Reference Sequence and Comparison Sequence and -dimensional Treatment

Reference Sequence: Win/Loss ratio [X_0];

Comparison Sequence: 2-point attempts [X_1], 2-point shot percentage [X_2], 3-point attempts [X_3], 3-point shot percentage [X_4], free throws attempted [X_5], free throw percentage [X_6], offensive rebound [X_7], defensive rebound [X_8], assist [X_9], error [X_{10}], steal [X_{11}] and foul [X_{12}].

According to index data of reference sequence and comparison sequence, the results are shown as Table 3 through non-dimensional statistical treatment after mean value.

Table 3 Schedule for Non-dimensional Statistical Treatment of Reference Sequence and Comparison Sequence Index

X_0	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	X_{10}	X_{11}	X_{12}
0.7605	1.1884	0.6531	1.0946	1.2402	0.7627	1.1388	1.2381	0.9931	1.0286	0.8241	0.3429	0.8333
0.9682	1.0435	0.9592	1.1351	1.2067	0.7627	0.8939	1.1429	0.8276	1.1143	0.7417	2.2286	0.7576
1.3717	0.7536	1.6531	0.8919	1.0726	1.2712	1.0776	0.7619	1.2000	1.4571	0.9889	1.0286	1.3889
1.1772	1.1884	0.7551	0.8108	0.8380	1.0678	0.8204	0.9524	1.3241	0.6857	1.6481	1.0286	1.1905
0.9285	0.8406	1.3469	1.2162	1.0056	0.7627	0.9796	0.8571	0.8276	0.9429	1.2361	0.8571	0.9804
0.7939	0.9855	0.9592	0.8514	0.6369	1.3729	1.0898	1.0476	0.8276	0.7714	0.9889	0.5143	1.1111

3.2.2. Maximum Difference and Minimum Difference at Two Poles of Difference Sequence

Difference Sequence: Note: $\triangle_{0i}=|X_{0i}-X_i|$,i=1,2.... m. Seek maximum difference and minimum difference at two poles, note: $M = \max_i \max_k \Delta_{oi}\left(k\right)$, $m = \min_i \min_k \Delta_{oi}\left(k\right)$. The results are shown as Table 4.

Table 4 Schedule for Maximum Difference and Minimum Difference at Two Poles of Difference Sequence

X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	X_{10}	X_{11}	X_{12}	min	Max
0.4279	0.1074	0.3341	0.4797	0.0022	0.3783	0.4776	0.2326	0.2681	0.0636	0.4176	0.0728	0.0022	0.4797
0.0752	0.0090	0.1669	0.2385	0.2055	0.0744	0.1746	0.1406	0.1461	0.2266	1.2603	0.2107	0.0090	1.2603
0.6181	0.2813	0.4799	0.2991	0.1006	0.2942	0.6098	0.1717	0.0854	0.3829	0.3432	0.0171	0.0171	0.6181
0.0112	0.4221	0.3664	0.3392	0.1094	0.3568	0.2248	0.1470	0.4915	0.4710	0.1486	0.0133	0.0112	0.4915
0.0879	0.4184	0.2877	0.0771	0.1658	0.0511	0.0714	0.1009	0.0144	0.3076	0.0714	0.0519	0.0144	0.4184
0.1917	0.1653	0.0575	0.1570	0.5790	0.2959	0.2538	0.0337	0.0224	0.1950	0.2796	0.3173	0.0224	0.5790

3.2.3. Grey Relational Coefficient

Table 5 Schedule for Relational Coefficient of Comparison Sequence and Reference Sequence

X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	X_{10}	X_{11}	X_{12}
0.5976	0.8573	0.6558	0.5697	1.0000	0.6271	0.5708	0.7329	0.7040	0.9115	0.6035	0.8995
0.8964	0.9893	0.7934	0.7280	0.7567	0.8976	0.7857	0.8204	0.8147	0.7381	0.3345	0.7521
0.5066	0.6938	0.5697	0.6805	0.8654	0.6841	0.5100	0.7886	0.8837	0.6242	0.6497	0.9769
0.9859	0.6010	0.6346	0.6524	0.8551	0.6407	0.7396	0.8137	0.5638	0.5743	0.8120	0.9827
0.8806	0.6031	0.6889	0.8941	0.7945	0.9282	0.9014	0.8650	0.9811	0.6743	0.9014	0.9271
0.7695	0.7949	0.9196	0.8034	0.5230	0.6828	0.7154	0.9525	0.9690	0.7663	0.6951	0.6675

According to the formula, $r_{oi}(k)=\frac{m+p*M}{\Delta_{oi}(k)+p*M}$, where, p is identification coefficient, 0< p <1; for $p\in(0,1)$, this study takes p =0.5. (k =1,2,……,n,i=1,2,……,m), and then calculate relational coefficient. The results are shown as Table 5.

3.2.4 .Grey Relational Grade

Relational coefficient is the degree of relation of comparison sequence and reference sequence at each time (i.e. each point on curve), so its number is more than one. While information decentralization is not convenient to make overall comparison, take one number for relational coefficient of each time (i.e. each point on curve), namely, seek its mean value to show the degrees of relation between comparison sequence and reference sequence. The results are shown as Table 6.

Table 6 Schedule for Degrees of Relation of Comparison Sequence and Reference Sequence

Index	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	X_{10}	X_{11}	X_{12}
Degrees of Relation	0.7728	0.7566	0.7103	0.7213	0.7991	0.7434	0.7038	0.8288	0.8194	0.7148	0.666	0.8676
Normalization (Weighing)	0.0849	0.0831	0.0780	0.0792	0.0878	0.0817	0.0773	0.0910	0.0900	0.0785	0.0732	0.0953
Sequence	5	6	10	8	4	7	11	2	3	9	12	1

According to the analysis on index data in Table 6, the importance of 12 indexes' influence on Chinese Men's Basketball Team in match at the 29th Olympic Games is as follows in sequence: X_{12}（0.0953）> X_8（0.0910）> X_9（0.0900）> X_5（0.0878）> X_1（0.0849）> X_2（0.0831）> X_6（0.0817）> X_4（0.0792）> X_{10}（0.0785）> X_3（0.0780）> X_7（0.0773）> X_{11}（0.0732）; the importance of defensive technology indexes is as follows in sequence: X_{12}（0.0953）> X_8（0.0910）> X_{11}（0.0732）; the importance of offensive technology indexes is as follows in sequence: X_9（0.0900）> X_5（0.0878）> X_1（0.0849）> X_2（0.0831）> X_6（0.0817）> X_4（0.0792）> X_{10}（0.0785）> X_3（0.0780）> X_7（0.0773）; and the importance of mean value of index weight of defensive technology and offensive technology is as follows in sequence: defensive technology (0.0865) and offensive technology (0.0823).

3.3. Analysis on Advantages and Disadvantages of Defensive Technology and Offensive Technology Used

3.3.1 Analysis on Advantages and Disadvantages of Defensive Technology Used

According to the importance of 12 indexes' influence on the performance of the match, classify the defensive technology, and the importance of defensive technology index is as follows in sequence: foul > defensive rebound > steal. On the basis of the statistics on defensive technology of six matches between China and other countries, the results are shown as Table 7.

Table 7 Schedule for Statistics on Defensive Technology Index of Six Matches between Chinese Men's Basketball Team and Other Countries at the 29th Olympic Games

Country	Foul	Defensive Rebound	Steal	Win/Loss ratio
China/USA	20\17	24\31	2\14	0.693
China/Spain	22\16	20\24	13\11	0.8823
China/Angola	12\24	29\13	6\11	1.25
China/Germany	14\20	32\35	6\7	1.0727
China/Greece	17\14	20\22	5\7	0.8461
China/ Lithuania	15\25	20\22	3\12	0.7234
Total	100\116	145\147	35\62	

Analysis on the basis of index data of Table 7, 1) in the 2 wins of Chinese Men's Basketball Team, its foul is 18 times less than that of foreign men's basketball teams, while in 3 losses of Chinese Men's Basketball Team, its foul is 12 times more than that of foreign men's basketball teams, and in the total 6 matches, its foul is 16 less than that of foreign men's basketball teams, which indicates that the influence of foul on the match is the greatest. 2) Defensive rebound is an important link from defense to offense, and the opportunity of offense is increased for the team that has more defensive rebound. In 2 wins of Chinese Men's Basketball Team, this technology index is higher than that of foreign men's basketball team, and defensive rebound is 13 times more than that of foreign men's basketball team; while in 4 losses of Chinese Men's Basketball Team, this technology index is lower than that of foreign men's basketball teams, and defensive rebound is 15 times less than that of foreign men's basketball team, which indicates that the influence of defensive rebound on the result of match is greater. 3) The influence of steal technology is relatively small, in 6 matches of Chinese Men's Basketball Team, steal is 27 times less than that of foreign men's basketball, which reflects that the exertion of steal technology is the worst, and indicates that the defense of Chinese Men's Basketball Team lacks aggressiveness.

3.3.2 Analysis on Advantages and Disadvantages of Offensive Technology Used

According to the importance of 12 indexes' influence on the result of the match, classify the offensive technology, and the importance of offensive technology index is as follows in sequence: assist > free throws attempted > 2-point attempts > 2-point shot percentage > free throw percentage > 3-point shot percentage > error > 3-point attempts > offensive rebound. On the basis of the statistics on offensive technology of six matches between China and other countries, the results are shown as Table 8.

Table 8 Schedule for Statistics on Offensive Technology Index of Six Matches between Chinese Men's Basketball Team and Other Countries at the 29th Olympic Games

Country	2-point Attempts	2-point Shot Percentage	3-point Attempts	3-point Shot Percentage	Free Throws Attempted	Free Throw Percentage	Offensive Rebound	Assist	Turnover	Win/Loss Ratio
China/USA	41\46	0.32\0.67	27\24	0.37\0.29	15\25	0.93\0.72	13\9	12\17	18\12	0.6930
China/Spain	36\57	0.47\0.53	28\17	0.36\0.29	15\17	0.73\0.58	12\20	13\16	20\22	0.8823
China/Angola	26\44	0.81\0.39	22\17	0.32\0.53	25\8	0.88\0.88	8\6	17\8	15\9	1.2500
China/Germany	41\40	0.37\0.30	20\22	0.25\0.27	21\13	0.67\1	10\12	8\4	9\14	1.0727
China/Greece	29\44	0.66\0.66	30\22	0.3\0.32	15\20	0.8\0.60	9\14	11\19	12\8	0.8461
China/Lithuania	34\32	0.47\0.66	21\31	0.19\0.42	13\13	0.89\1.00	11\9	9\15	15\10	0.7234
Total	207\263	0.49\0.53	148\133	0.3\0.35	118\96	0.82\0.76	63\70	70\79	89\75	

Analysis on the basis of index data of Table 8, 1) assist reflects the organization offensive ability of a team and individual cooperation consciousness. In 2 wins of Chinese Men's Basketball Team, this technology index is higher than that of foreign men's basketball team, and assist is 13 times more than that of foreign men's basketball teams; while in 4 losses of Chinese Men's Basketball Team, this technology index is lower than that of foreign men's basketball teams, and assist is 22 times less than that of foreign men's basketball teams, which indicates that the influence of the exertion of assist technology on the result of match is the greatest. 2) Free throws attempted and 2-point attempts have greater influence. In 2 wins of Chinese Men's Basketball Team, free throws attempted is 22 times more than that of foreign men's basketball teams, while in 4 losses of Chinese Men's Basketball Team, free throws attempted is 17 times less than that of foreign men's basketball teams, but in the total 6 matches, 2-point attempts is 56 times less than that of foreign men's basketball teams. Chinese Men's Basketball Team has Yao Ming the strong center, but the offensive ability of medium distance is worse. 3) Offensive rebound only has a little influence, and offensive rebound is the only one way to obtain continuous offense. Chinese Men's Basketball Team has the opportunity to get offensive rebound for 268 times (except free throw loss rebound), foreign men's basketball teams have the opportunity to get offensive rebound for 211 times (except free throw loss

rebound), but offensive rebound of Chinese Men's Basketball Team is less than that of foreign men's basketball teams, which indicates that Chinese Men's Basketball Team exerts this technology worse.

4. Conclusions and Suggestions

4.1 The skill level of Chinese Men's Basketball Team in the 6 matches at the 29th Olympic Games is classified as follows: 1) advantage and disadvantage indexes of defense in sequence: foul, defensive rebound and steal; 2) advantage and disadvantage indexes of attack in sequence: assist, free throws attempted, 2-point attempts, two-point shot percentage, free throw percentage, 3-point shot percentage, turnover, 3-point attempts, and offensive rebound; The ratio of the mean value (0.0865/0.0823) of the index weighing of defensive technology and offensive technology indicates that Chinese Men's Basketball Team's defensive technology is better than its offensive technology at the 29th Olympic Games.

4.2 Suggestions: According to the analysis on the statistical results of six matches of Chinese Men's Basketball Team at the 29th Olympic Games, Chinese Men's Basketball Team in future training and matches should, in respect of defense, strengthen reasonable use of foul strategy, future improve the defensive ability to control defensive rebound and actively steal, especially the training on the ability of steal; and in respect of offense, enhance the offense of medium distance, improve shot percentage and the ability to actively get offensive rebound, and reduce turnover as much as possible.

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